
New Combinations in Californian *Arnica* and *Monolopia* (Compositae)

Bruce G. Baldwin

Jepson Herbarium and Department of Integrative Biology, University of California, Berkeley,
California 94720-2465, U.S.A.

ABSTRACT. New combinations in *Arnica* L. and *Monolopia* DC. are made in light of evidence from a phylogenetic study of helenioid Heliantheae that each of the two genera is paraphyletic. Transfers herein of *Whitneya dealbata* A. Gray to *Arnica* and *Lembertia congdonii* (A. Gray) Greene to *Monolopia* allow for circumscriptions of *Arnica* and *Monolopia* that better reflect phylogenetic relationships.

Results of a phylogenetic study of helenioid Heliantheae or Helenieae sensu lato (Baldwin & Wessa, 1997, & unpublished) lead me to conclude that *Arnica* L. and *Monolopia* DC. are each paraphyletic. The following combinations are needed to make *Arnica* and *Monolopia* monophyletic.

***Arnica dealbata* (A. Gray) B. G. Baldwin, comb. nov.** Basionym: *Whitneya dealbata* A. Gray, Proc. Amer. Acad. Arts 6: 550. 1865. TYPE: U.S.A. California: "dry woods on the Yosemite trail, alt. 7,000 feet," 1863, W. H. Brewer 1627 (holotype, GH).

In his description of *Whitneya*, Asa Gray (1865) noted morphological similarities to *Arnica*, but absence of pappus in *Whitneya* made its relationships difficult to assess. Hoffmann (1890) placed *Whitneya* with *Baileya* Harvey & A. Gray ex Torrey and *Psilostrophe* DC. in subtribe Riddelliinae on the basis of shared persistence of the ray corollas, a treatment followed by later workers such as Rydberg (1914) and Keck (1959). Ornduff et al. (1967) concluded from cytological and morphological considerations that *Whitneya* is closely related to *Arnica*, a view subsequently endorsed by Turner and Powell (1977) and Nordenstam (1977) and implicit in Robinson's (1981) and Karis and Ryding's (1994) placement of *Arnica* and *Whitneya* together in Chaenactidinae. Results from phylogenetic analyses of nuclear ribosomal DNA sequences provide strong support for a nested position of *Whitneya* within a group corresponding to *Arnica* sensu Maguire (1943) plus *A. mallotopus* (Franchet & Savatier) Makino [= *Mallotopus japonicus* Franchet & Savatier].

Like other species of *Arnica*, *A. dealbata* is a rhizomatous perennial with opposite leaves and each ray floret associated with a phyllary. The chromosome number reported for *A. dealbata* is $2n = 19$ II, corresponding to the diploid condition in *Arnica* (see Wolf, 1980, 1987).

***Monolopia congdonii* (A. Gray) B. G. Baldwin, comb. nov.** Basionym: *Eatonella congdonii* A. Gray, Proc. Amer. Acad. Arts 19: 20. 1883. *Lembertia congdonii* (A. Gray) Greene, Fl. Fran. 441. 1897. SYNTYPES: U.S.A. California: Tulare County, "Deer Creek," Mar. 1881, J. W. Congdon 439 (GH); "southern part of the San Joaquin Valley," Mar. 1881, C. C. Parry s.n. (GH). [Rydberg (1914) cited the *Congdon* collection as type.]

Greene's removal from *Eatonella* A. Gray of *E. congdonii* (transferred to a new genus, *Lembertia* Greene) is upheld by phylogenetic evidence that (1) *E. nivea* (D. C. Eaton) A. Gray, the type species of *Eatonella*, is the sister group of *Hulsea* Torrey & A. Gray; and (2) *Lembertia* and *Monolopia* constitute a clade (Baldwin & Wessa, 1997, & unpublished). Johnson (1978) concluded from morphological, chromosomal, and distributional studies that *Lembertia* and *Monolopia* constitute a "monolopiod line" distinct from an "eriophyloid line" comprising *Eriophyllum*, *Pseudobahia*, and *Syntrichopappus*. Results from phylogenetic analyses of nuclear ribosomal DNA sequences (Baldwin & Wessa, unpublished) confirm Johnson's (1978) hypothesis and provide robust support for nested placement of *Lembertia* within *Monolopia* sensu Johnson (1978).

Like other species of *Monolopia* and unlike the closely related genera *Eriophyllum*, *Pseudobahia*, and *Syntrichopappus*, members of *M. congdonii* possess a small lobe opposite the ray-corolla lamina, black phyllary hairs, unequal hair cells on the distal surfaces of the cypselae, and a chromosome number that falls within the range of $2n = 10$ to 13 II (i.e., $2n = 11$ II) (Johnson, 1978). *Monolopia congdonii* and two of the four remaining species of *Monolopia*, i.e., *M. lanceolata* Nuttall and *M. stricta*

Crum, have broadly overlapping distributions in the southern San Joaquin Valley and adjacent valleys of the Inner South Coast Ranges of California (Johnson, 1978).

Acknowledgments. I thank Ted Barkley, Dave Keil, and John Strother for their helpful reviews of the manuscript. I also thank the curator of GH for specimen loans. This paper is based on research supported by the National Science Foundation (DEB-9458237), the Lawrence R. Heckard Endowment Fund, and Roderick Park and other generous Friends of the Jepson Herbarium.

Literature Cited

- Baldwin, B. G. & B. L. Wessa. 1997. Origin of Madiinae and Dimeresia from within Chaenactidinae (Asteraceae). Amer. J. Bot. 84 (6, supplement): 176–177.
- Gray, A. 1865. *Whitneya*, nov. gen. Proc. Amer. Acad. Arts 6: 549–550.
- Hoffmann, O. 1890. Riddellinae. In Engler & Prantl, Die natürlichen Pflanzenfamilien IV(5): 253.
- Johnson, D. E. 1978. Systematics of Eriophyllinae (Compositae). Ph.D. Dissertation, University of California, Berkeley.
- Karis, P. O. & O. Ryding. 1994. Tribe Helenieae. Pp. 521–558 in K. Bremer, Asteraceae: Cladistics and Classification. Timber Press, Portland, Oregon.
- Keck, D. D. 1959. Helenieae. Pp. 1129–1161 in P. A. Munz, A California Flora. Univ. California Press, Berkeley.
- Maguire, B. 1943. A monograph of the genus *Arnica*. Brittonia 4: 386–510.
- Nordenstam, B. 1977. Senecioneae and Liabeae—Systematic review. Pp. 799–830 in V. H. Heywood, J. B. Harborne & B. L. Turner (editors), The Biology and Chemistry of the Compositae, Vol. II. Academic Press, London.
- Ornduff, R. O., T. Mosquin, D. W. Kyhos & P. H. Raven. 1967. Chromosome numbers in Compositae. VI. Senecioneae. II. Amer. J. Bot. 54: 205–213.
- Robinson, H. 1981. A revision of the tribal and subtribal limits of the Heliantheae (Asteraceae). Smithsonian Contr. Bot. 51: 1–102.
- Rydberg, P. A. 1914. Riddellinae. North American Flora 34: 6–11.
- Turner, B. L. & A. M. Powell. 1977. Helenieae—Systematic review. Pp. 699–737 in V. H. Heywood, J. B. Harborne & B. L. Turner (editors), The Biology and Chemistry of the Compositae, Vol. II. Academic Press, London.
- Wolf, S. J. 1980. Cytogeographical studies in the genus *Arnica* (Compositae: Senecioneae). I. Amer. J. Bot. 67: 300–308.
- _____. 1987. Cytotaxonomic studies in the genus *Arnica* (Compositae: Senecioneae). Rhodora 89: 391–400.